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Specification

BTEC Specialist qualifications

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

For first teaching October 2011

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BTEC Specialist qualification titles covered by this specification

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

This qualification has been accredited to the Qualifications and Credit Framework (QCF) and is eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification title listed above features in the funding lists published annually by the DfE and the regularly updated website www.education.gov.uk/. The QCF Qualification Number (QN) should be used by centres when they wish to seek public funding for their learners. Each unit within a qualification will also have a QCF unit code.

The QCF qualification and unit codes will appear on learners' final certification documentation.

The Qualification Number for the qualification in this publication is:

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)	600/3190/6

This qualification title will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Edexcel.

This qualification is accredited by Ofqual as being part of Apprenticeship framework for Rail Engineering (Track).

If learners are taking this qualification as part of the Apprenticeship framework, they need to complete the additional 3-credit unit, Employment Rights and Responsibilities in the Public Transport Sector (ERR1).

Welcome to the Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

We are delighted to introduce our new qualification, available for teaching from October 2011. This qualification has been revised, and conforms with the requirements of the new QCF (Qualifications and Credit Framework).

Focusing on the Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

Rail travel has been experiencing strong growth. The infrastructure owners and the train operators have been investing heavily in assets to meet this growth. The assets that go to make up the railway – the track, signals and trains - need to be safely and efficiently maintained. Companies such as Network Rail require skilled staff to undertake the complete range of engineering tasks' including track maintenance. There are also major contractors and sub-contractors dealing with all the engineering tasks, including supplying skilled staff to support the maintenance and renewal work. The industry is always looking for innovative ways of doing things to reduce cost while maintaining its outstanding safety record.

The industry recognises the value of apprenticeships to deliver individuals with the right skills, underpinning knowledge and motivation to deliver the maintenance and renewal services to support a safe, efficient and effective railway.

The Apprenticeship in Rail Engineering (Track) will help employers address the challenges facing the industry, as identified by the National Skills Academy for Rail Engineering (NSARE):

- Recruitment of school leavers to train as apprentices, with a career path to becoming professional railway engineers (Level 4+) for those sufficiently motivated and capable.
- Up-skilling of the engineering workforce to a minimum of Level 2, including transient workers.
- General up-skilling of the workforce (Levels 1 to 3) to meet the technology and efficiency demands of the railway of the future.
- Training of today's craftsmen to become the supervisors (Level 3+) of tomorrow.

The Rail Engineering (Track) framework covers the Skilled Track Operative job role. Skilled Track Operatives play a key role in ensuring that the network of track across the UK is reliable and in good working order. They have to make sure that the track is in good condition for the safe and efficient running of trains.

Who is this qualification for?

This qualification is for all learners aged 16 and above who are capable of reaching the required standards.

Edexcel's policy is that the qualification should:

- be free from any barriers that restrict access and progression
- ensure equality of opportunity for all wishing to access the qualification.

What are the benefits of this qualification to the learner and employer?

This qualification gives learners the opportunity to perform many tasks, from repairing signals to maintaining tracks.

Trains, of course, need engineers to keep them running, but they also need permanent way (track) engineers to make sure the tracks are in good condition.

Train drivers know where to go, how fast to travel, and when to approach a station, only because of a network of signals.

If these go wrong, it could mean delays, or even disasters. Signalling engineers and technicians keep everything in working order.

With other jobs involving laying the track, and maintaining communication links between stations and trains, there are many opportunities for the technically minded in this qualification.

What are the potential job roles for those working towards this qualification?

- Permanent way renewals
- Permanent way maintenance
- Traction and rolling stock
- Electrification and plant.

What progression opportunities are available to learners who achieve this qualification?

On completion of this qualification, learners may continue working as skilled track operatives. From this point, learners can go on to become team leaders and supervisors and eventually move in to management positions.

Alternatively, completion of the Level 2 Certificate in Rail Engineering Track Maintenance (QCF) may support progression to the Level 3 Diploma in Rail Engineering Track Maintenance (QCF).

Further information is available in *Annexe A*.

Straightforward to implement, teach and assess

Implementing BTECs couldn't be easier. They are designed to fit easily into your curriculum and can be studied independently or alongside existing qualifications, to suit the interests and aspirations of learners. The clarity of assessment makes grading learner attainment simpler.

Engaging for everyone

Learners of all abilities flourish when they can apply their own knowledge, skills and enthusiasm to a subject. BTEC qualifications make explicit the link between theoretical learning and the world of work by giving learners the opportunity to apply their research, skills and knowledge to work-related contexts and case studies. These applied and practical BTEC approaches give all learners the impetus they need to achieve and the skills they require for workplace or education progression.

Recognition

BTECs are understood and recognised by a large number of organisations in a wide range of sectors. BTEC qualifications are developed with key industry representatives and Sector Skills Councils (SSC) to ensure that they meet employer and learner needs – in this case the GoSkills SSC. Many industry and professional bodies offer successful BTEC learners exemptions for their own accredited qualifications.

All you need to get started

To help you off to a flying start, we've developed an enhanced specification that gives you all the information you need to start teaching BTEC. This includes:

- a framework of equivalencies, so you can see how this qualification compares with other Edexcel vocational qualifications
- information on rules of combination, structures and quality assurance, so you can deliver the qualification with confidence
- explanations of the content's relationship with the learning outcomes
- guidance on assessment, and what the learner must produce to achieve the unit.

Don't forget that we're always here to offer curriculum and qualification updates, local training and network opportunities, advice, guidance and support.

Contents

What are BTEC Level 2 Specialist qualifications?

BTEC Specialist qualifications are qualifications at Entry level to level 3 in the Qualifications and Credit Framework (QCF) and are designed to provide specialist work-related qualifications in a range of sectors. They give learners the knowledge, understanding and skills that they need to prepare for employment. The qualifications also provide career development opportunities for those already in work. Consequently, they provide a course of study for full-time or part-time learners in schools, colleges and training centres.

BTEC Specialist qualifications provide much of the underpinning knowledge and understanding for the National Occupational Standards for the sector, where these are appropriate. They are supported by the relevant Standards Setting Body (SSB) or Sector Skills Council (SSC). A number of BTEC Specialist qualifications are recognised as the knowledge components of Apprenticeships Frameworks. They attract achievement and attainment table points that equate to similar-sized general qualifications.

On successful completion of a BTEC Specialist qualification, learners can progress to or within employment and/or continue their study in the same, or related vocational area.

Care needs to be exercised when registering learners, as the titling conventions and titles for the revised QCF versions of the BTEC Level 2 Firsts and BTEC Level 3 Nationals have changed.

The QCF is a framework which awards credit for qualifications and units and aims to present qualifications in a way that is easy to understand and measure. It enables learners to gain qualifications at their own pace along flexible routes.

There are three sizes of qualification in the QCF:

- Award (1 to 12 credits)
- Certificate (13 to 36 credits)
- Diploma (37 credits and above).

Every unit and qualification in the framework will have a credit value.

The credit value of a unit specifies the number of credits that will be awarded to a learner who has achieved the learning outcomes of the unit.

The credit value of a unit is based on:

- one credit for those learning outcomes achievable in 10 hours of learning
- learning time – defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes of the unit to the standard determined by the assessment criteria.

The credit value of the unit will remain constant in all contexts, regardless of the assessment method used for the qualification(s) to which it contributes.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Edexcel Level 2 Certificate

The Edexcel Level 2 Certificate offers an engaging programme for those who are clear about the vocational area they want to learn more about. These learners may wish to extend their programme through the study of a related GCSE, a complementary NVQ or other related vocational or personal and social development qualification. These learning programmes can be developed to allow learners to study complementary qualifications without duplication of content.

For adult learners the Edexcel Level 2 Certificate can extend their knowledge and understanding of work in a particular sector. It is a suitable qualification for those wishing to change career or move into a particular area of employment following a career break.

Key features of the Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

The Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF) has been developed to give learners the opportunity to:

- engage in learning that is relevant to them and that will provide opportunities to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life
- achieve a nationally recognised level 2 vocationally related qualification
- progress to employment in a particular vocational sector
- progress to related general and/or vocational qualifications.

National Occupational Standards

Where relevant, Edexcel level 2 qualifications are designed to provide some of the underpinning knowledge and understanding for the National Occupational Standards (NOS), as well as developing practical skills in preparation for work and possible achievement of NVQs in due course. NOS form the basis of National Vocational Qualifications (NVQs). Edexcel Level 2 (QCF) qualifications do not purport to deliver occupational competence in the sector, which should be demonstrated in a work context.

Each unit in the specification identifies links to elements of the NOS in *Annexe C*.

The Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge Knowledge (QCF) relates to the following NOS.

GoSkills Passenger Transport National Occupational Standards (NOS). GoSkills is the Sector Skills Council for the Passenger Transport Sector, and is responsible for developing the National Occupational Standards for the sector.

Rules of combination

The rules of combination specify the credits that need to be achieved, through the completion of particular units, for the qualification to be awarded. All accredited qualifications within the QCF have rules of combination.

Rules of combination for Edexcel Level 2 qualifications

When combining units for an Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF), it is the centre's responsibility to ensure that the following rules of combination are adhered to.

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

1 Qualification credit value: a minimum of 28 credits.

2 Minimum credit to be achieved at the level of the qualification: 28 credits.

3 All credits must be achieved from the units listed in this specification.

4 If learners are taking this qualification as part of the Apprenticeship framework, they need to complete Employment Rights and Responsibilities in the Public Transport Sector (ERR1) unit.

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)

The Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF) is a 28-credit and 280 guided-learning-hours (GLH) qualification consisting of four mandatory units. Learners must achieve the four mandatory units.

If learners are taking this qualification as part of the Apprenticeship framework, they need to complete the additional 3-credit unit, Employment Rights and Responsibilities in the Public Transport Sector (ERR1).

Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF)				
Unit	**Unit reference**	**Mandatory units**	**Credit**	**Level**
1	D/602/5873	Engineering Industry	7	2
2	K/602/5875	Engineering Technology	7	2
3	T/602/5877	Maintenance Technology	7	2
4	A/602/5878	Maintaining Mechanical Devices and Equipment	7	2
Unit		**Mandatory unit**	**Credit**	**Level**
ERR1	L/602/5934	Employment Rights and Responsibilities in the Public Transport Sector	3	2

Assessment

All units within this qualification are internally assessed. The qualifications are criterion referenced, based on the achievement of all the specified learning outcomes.

To achieve a 'pass' a learner must have successfully passed **all** the assessment criteria.

Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the standard determined by the assessment criteria and
- achieve the learning outcomes.

All the assignments created by centres should be reliable and fit for purpose, and should be built on the unit assessment criteria. Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms, including performance observation, presentations and posters, along with projects, or time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities. The creation of assignments that are fit for purpose is vital to achievement and their importance cannot be over-emphasised.

The assessment criteria must be clearly indicated in the assignments briefs. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment criteria.

When designing assignments briefs, centres are encouraged to identify common topics and themes. A central feature of vocational assessment is that it allows for assessment to be:

- current, ie to reflect the most recent developments and issues
- local, ie to reflect the employment context of the delivering centre
- flexible to reflect learner needs, ie at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

Qualification grade

Learners who achieve the minimum eligible credit value specified by the rule of combination will achieve the qualification at pass grade.

In the Edexcel Level 2 Specialist qualifications each unit has a credit value which specifies the number of credits that will be awarded to a learner who has achieved the learning outcomes of the unit. This has been based on:

- one credit for those learning outcomes achievable in 10 hours of learning time
- learning time being defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes of the unit to the standard determined by the assessment criteria
- the credit value of the unit remaining constant regardless of the method of assessment used or the qualification to which it contributes.

Quality assurance of centres

Edexcel level 2 qualifications provide a flexible structure for learners, enabling programmes of varying credits and combining different levels. For the purposes of quality assurance, all individual qualifications and units are considered as a whole.

Centres delivering the Edexcel Level 2 qualifications must be committed to ensuring the quality of the units and qualifications they deliver, through effective standardisation of assessors and verification of assessor decisions. Centre quality assurance and assessment is monitored and guaranteed by Edexcel.

The Edexcel quality assurance processes will involve:

- centre approval for those centres not already recognised as a centre for BTEC qualifications
- approval for the Edexcel level 2 qualifications and units
- **compulsory** Edexcel-provided training and standardisation for internal verifiers and assessors leading to the accreditation of lead internal verifiers via the OSCA system
- quality review of the centre verification practice
- centre risk assessment by Edexcel of overarching processes and quality standards
- remedial training and/or assessment sampling for centres identified through standardisation or risk assessment activities as having inadequate quality, assessment or internal verification processes.

Approval

Centres are required to declare their commitment to ensuring the quality of the programme of learning and providing appropriate assessment opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities.

Centres already holding BTEC approval are able to gain qualification approval online. New centres must complete a centre approval application.

Quality Assurance Guidance

Details of quality assurance for the Edexcel level 2—3 qualifications are set out in centre guidance which is published on our website (www.edexcel.com).

Programme design and delivery

Mode of delivery

Edexcel does not normally define the mode of delivery for Edexcel BTEC Entry to level 3 qualifications. Centres are free to offer the qualifications using any mode of delivery (such as full-time, part-time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure a course relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

Resources

Edexcel level 2 qualifications are designed to give learners an understanding of the skills needed for specific vocational sectors. Physical resources need to support the delivery of the programme and the assessment of the learning outcomes, and should therefore normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Edexcel.

Where specific resources are required these have been indicated in individual units in the *Essential resources* sections.

Delivery approach

It is important that centres develop an approach to teaching and learning that supports the vocational nature of Edexcel level 2 qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of learners' experience.

Functional skills

Edexcel level 2 BTEC Specialist qualifications give learners opportunities to develop and apply Functional Skills. Functional Skills are, however, not required to be achieved as part of the BTEC Specialist qualification(s) rules of combination. Functional skills are offered as stand-alone qualifications.

Access and recruitment

Edexcel's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Edexcel's policy on learners with particular requirements.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a higher-level qualification.

Restrictions on learner entry

The Edexcel Level 2 in Rail Engineering Underpinning Knowledge (QCF) is accredited on the QCF for learners aged 16 and above.

In particular sectors the restrictions on learner entry might also relate to any physical or legal barriers. For example people working in health, care or education are likely to be subject to Criminal Records Bureau (CRB) checks.

Access arrangements and special considerations

Edexcel's policy on access arrangements and special considerations for BTEC and Edexcel NVQ qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the 2010 Equality Act) without compromising the assessment of skills, knowledge, understanding or competence.

Further details are given in the policy document *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications*, which can be found on the Edexcel website (www.edexcel.com). This policy replaces the previous Edexcel policy (Assessment of Vocationally Related Qualifications: Regulations and Guidance Relating to Learners with Special Requirements, 2002) concerning learners with particular requirements.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Edexcel encourages centres to recognise learners' previous achievements and experiences at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

Unit format

All units in the Edexcel level 2 Specialist qualifications have a standard format. The unit format is designed to give guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each unit has the following sections.

Unit title

The unit title is accredited on the QCF and this form of words will appear on the learner's Notification of Performance (NOP).

Unit code

Each unit is assigned a QCF unit code that appears with the unit title on the National Database of Accredited Qualifications.

QCF level

All units and qualifications within the QCF will have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry Level to Level 8. The level of the unit has been informed by the QCF level descriptors and, where appropriate, the NOS and/or other sector/professional benchmarks.

Credit value

All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.

Guided learning hours

Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.

Unit aim

The aim provides a clear summary of the purpose of the unit and is a succinct statement that summarises the learning outcomes of the unit.

Unit introduction

The unit introduction gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a snapshot of the unit and the key knowledge, skills and understanding gained while studying it. The unit introduction also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

Learning outcomes

The learning outcomes of a unit set out what a learner is expected to know, understand or be able to do as the result of a process of learning.

Assessment criteria

The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or set of learning outcomes, has been achieved. The learning outcomes and assessment criteria clearly articulate the learning achievement for which the credit will be awarded at the level assigned to the unit.

Unit content

The unit content identifies the breadth of knowledge, skills and understanding needed to design and deliver a programme of learning to achieve each of the learning outcomes. This is informed by the underpinning knowledge and understanding requirements of the related National Occupational Standards (NOS), where relevant. The content provides the range of subject material for the programme of learning and specifies the skills, knowledge and understanding required for achievement of the unit.

Each learning outcome is stated in full and then the key phrases or concepts related to that learning outcome are listed in italics followed by the subsequent range of related topics.

Relationship between content and assessment criteria

The learner should have the opportunity to cover all of the unit content.

It is not a requirement of the unit specification that all of the content is assessed. However, the indicative content will need to be covered in a programme of learning in order for learners to be able to meet the standard determined in the assessment criteria.

Content structure and terminology

The information below shows how the unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcome: this is shown in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which must be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in plain text and amplify the sub-heading. The elements must be covered in the delivery of the unit. Semi-colons mark the end of an element.

- Brackets contain amplification of content which must be covered in the delivery of the unit.
- 'eg' is a list of examples, used for indicative amplification of an element (that is, the content specified in this amplification could be covered or could be replaced by other, similar material).

Essential guidance for tutors

This section gives tutors additional guidance and amplification to aid understanding and a consistent level of delivery and assessment. It is divided into the following sections.

- *Delivery* – explains the content's relationship to the learning outcomes and offers guidance about possible approaches to delivery. This section is based on the more usual delivery modes but is not intended to rule out alternative approaches.
- *Assessment* – gives amplification of the nature and type of evidence that learners need to produce in order to achieve the unit. This section should be read in conjunction with the assessment criteria.
- *Essential resources* – identifies any specialist resources needed to allow learners to generate the evidence required for each unit. The centre will be asked to ensure that any requirements are in place when it seeks approval from Edexcel to offer the qualification.
- *Indicative resource materials* – gives a list of learner resource material that benchmarks the level of study.

Units

Unit 1: Engineering Industry

Unit code: D/602/5873

QCF level 2: BTEC Specialist

Credit value: 7

Guided learning hours: 70

Unit aim

This unit aims to enable learners to develop knowledge and understanding of working in the engineering industry, specifically the rail engineering sector. The unit focuses on how to work safely and effectively.

Unit introduction

This unit gives learners an overview of working within the rail engineering industry, covering health and safety, effective communication and technical drawings and specifications. It also gives an overview of how to work effectively within the engineering workplace.

Applying relevant safe working practices is essential when working in an engineering workshop or maintenance depot. In this unit learners will explore the various roles and responsibilities in relation to health and safety, procedures for maintaining safe work practices, associated legislation, risk assessment, hazard identification and dangerous occurrences.

The ability to communicate effectively is an essential skill in all aspects of life. The usual methods of communication – speaking, reading and writing –are no less important to engineers. However, engineers also need to convey technical information such as scale, perspective and standards of working. Learners will have the opportunity to use a range of information sources and communication methods, including those used to convey technical information. Leading on from this, learners will look at the principles of technical drawings and specifications, and their applications, before interpreting technical drawings and standard conventions.

Finally, learners will investigate the standards and conduct expected in the engineering workplace and demonstrate how to work effectively within this environment, both individually and as part of a team.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes		Assessment criteria	
1	Know the engineering health and safety requirements	1.1	Define the current health and safety regulations applicable to engineering operations
		1.2	Define employers' responsibilities to comply with health and safety in terms of provision in the workplace
		1.3	Describe the health and safety implementation within the individual organisation
		1.4	Describe the essential health and safety requirements applicable to the protection of operators and bystanders
		1.5	Classify and define different types of health and safety signs that are used in an engineering/manufacturing environment
		1.6	Define the roles, responsibilities and powers of health and safety personnel
		1.7	Describe the human and environmental conditions leading to accidents in the workplace and the means of controlling them
		1.8	Describe how to carry out and report risk assessments
		1.9	Apply the general rules for safe working practices
		1.10	Demonstrate the need for the provision of first aid treatment
		1.11	Define what is meant by a dangerous occurrence
		1.12	Describe methods of fire prevention and control
		1.13	Describe the methods and procedures necessary to make a hazardous area safe before starting work

Learning outcomes		Assessment criteria	
		1.14	Describe the basic principles behind safety checks
2	Be able to demonstrate effective methods of communication	2.1	Describe procedures regarding employment rights and responsibilities
		2.2	Describe the communication systems used in the workplace
		2.3	Describe the roles and responsibilities of various departments and personnel within an engineering organisation
		2.4	Use a range of methods of communication
		2.5	Use a range of sources of engineering information
		2.6	Use a range of methods of communicating technical information
		2.7	Illustrate the purpose of a design brief
		2.8	Establish where to seek advice and guidance
		2.9	Describe the correct approach when seeking advice and guidance
3	Understand drawings and specifications	3.1	Describe the purpose of technical drawings and specifications
		3.2	Interpret technical drawings using current standards
		3.3	Interpret the essential information found on drawings
		3.4	Describe the purpose of standards in engineering
		3.5	Describe the use of specifications and quality systems
		3.6	Interpret standard conventions used on technical drawings
		3.7	Interpret and apply other features associated with technical information

Learning outcomes		Assessment criteria	
4	Demonstrate an awareness of working in engineering	4.1	Illustrate the approach expected within an organisation
		4.2	Demonstrate how to work effectively within an engineering workplace by displaying the conduct expected
		4.3	Describe how to effectively request advice from colleagues, trainers or supervisors
		4.4	Describe how to deal with conflict situations
		4.5	Describe how to avoid conflict situations
		4.6	Demonstrate how to function effectively within a workplace team

Unit content

1 **Know the engineering health and safety requirements**

Health and safety regulations: appropriate regulations and legislation eg Health and Safety at Work Act (1994), Personal Protective Equipment at Work Regulations (2002), Manual Handling Operations Regulations (2002); Lifting Operations and Lifting Equipment Regulations Reporting of Injuries (1998), Diseases and Dangerous Occurrences Regulations (1995), The Control of Noise at Work Regulations (2005), Control of Substances Hazardous to Health Regulations (2004), Management of Health and Safety at Work Regulations (2006)

Employer responsibilities: provision of a safe working environment eg safe equipment, risk assessment; procedures eg for use in emergencies, for reporting accidents; staff awareness eg induction, training (in-house and external), appropriate documentation, key health and safety personnel

Implementation: policies and procedures eg for use in emergencies, for reporting accidents; appropriate health and safety and first aid personnel

Workplace protection: appropriate protective equipment eg personal protective equipment, eye protectors; awareness of areas authorised to enter; safe working practices

Health and safety signs: warning signs eg hazardous substances; mandatory signs eg wear hard hats; prohibition signs eg no unauthorised access; fire exits

Health and safety personnel: qualified first aiders; Health and Safety Executive inspectors; internal health and safety officers; local council health and safety advisers

Human and environmental conditions: consideration of the workplace and its potential to cause harm eg confined spaces, electrical hazards, chemicals; causes of accidents eg lack of experience/training, improper behaviour, lack of attention to detail, faulty machinery or equipment; prevention measures eg use of recognised procedures, substances control, guarding, lifting assessments and manual handling assessments, regular inspection, use of Personal Protective Equipment (PPE)

Risk assessments: items/area to be assessed eg machine operation, work area; five steps (principal hazards, who is likely to be injured/harmed, evaluate the risks and decide on adequacy of precautions, recording findings, review assessment); risks eg hazardous substances, faulty electrical equipment, damaged or trailing cables

Safe working practices: fire prevention; accident prevention and reporting; risk assessment; use of equipment; manual handling eg materials; personal protective equipment (PPE); closing down equipment safely; storing equipment correctly; safe disposal of waste materials; emergency procedures eg within the learning environment, workplace; common hazards; work area eg preparation, restoring the work area after maintenance; ensuring appropriate staff are aware of activities, use of warning signs, taping off areas

First aid: qualified first aiders; first aid box

Fire prevention and control: emergency procedures eg use of appropriate fire extinguishers, automatic sprinklers, fire alarms, practice fire drills, evacuation routes, assembly points; fire wardens; causes of fire eg conditions required for combustion

Making hazardous areas safe: sealing off the affected area; use and position of appropriate warning signs; reporting to the appropriate person; turning off power sources

Safety checks: prepare work environment eg area free from hazards, safety procedures implemented, PPE and tools obtained and checked (safe and usable condition)

2 **Be able to demonstrate effective methods of communication**

Employment rights and responsibilities: procedures to follow if someone needs to take time off holiday entitlement; bank holidays; sickness procedures; self-certification; medical certificate; grievance procedure eg informal approach management structure, ACAS (Advisory, Conciliation and Arbitration Service) procedures; contract of employment eg terms and conditions, hours, pay rate, sources of information and advice on employment issues

Communication systems: use of information eg for the solution of engineering problems, for product/service/topic research, gathering data or material to support own work, checking validity of own work/findings; requesting advice/further information; confirming instructions

Roles and responsibilities: departments eg finance, purchasing, human resources, production; staff eg managers, health and safety officers, inspectors, maintenance engineers; roles and responsibilities eg ensure staff awareness (health and safety, limits of job role, lines of reporting), ensure staff have all the necessary information to carry out their work

Methods of communication: written eg lists, mind mapping/flow diagrams, email, fax, graphs, charts and diagrams; verbal eg use of appropriate technical language, tone; listening eg use of paraphrasing and note-taking to clarify meaning; impact and use of body language in verbal communication

Sources of information: non-computer-based sources eg books, technical reports, institute and trade journals, data sheets and test/experimental results data, manufacturers' catalogues; computer-based sources eg inter/intranet, CD ROM-based information (manuals, data, analytical software, manufacturers' catalogues), spreadsheets, databases

Technical information: sketches, diagrams, drawings, freehand sketches of engineering arrangement; planning documentation, schedules of work; inspection reports; maintenance reports; conventions and standards eg layout and presentation, use of appropriate standards (British (BSI), International (ISO))

Advice and guidance: sources of advice and guidance eg instruction manuals, handbooks, organisational procedures; people eg supervisor, health and safety officer, human resources; using the correct approach

3 Understand drawings and specifications

Technical drawings and specifications: product eg features, dimensions and tolerances, surface finish, materials, size, shape; manufacturing/assembly/ process instructions eg cutting lists, assembly arrangements; equipment requirements; manufacturing data

Current standards: British Standards eg BS8888, BS3939, BS2917, PP7307; company-standardised layouts eg drawing number, title and issue number, projection symbols (first angle, third angle), scale, units, general tolerances, drawing; line types eg centre, construction, outline, hidden, leader, dimension; lettering eg titles, notes; orthographic projection eg first angle, third angle; views eg elevation, plan, end, section, auxiliary; symbols and abbreviations eg A/F, CHAM, Φ, R, PCD

Essential information: batch requirements, parts list; drawing number, title and issue number, projection symbols, scale, units, general tolerances, name of person responsible for producing drawing; representation of common features eg screw threads, springs, splines, repeated items; section views eg hatching style, webs, nuts, bolts and pins, solid shafts; symbols and abbreviations; projection

Purpose of standards: benchmarks to monitor progress and review quality; provide technical information and data; ensure consistency

Specifications and quality systems: quality systems eg quality assurance, quality control, audit/inspection requirements, reports and records, procedures to implement corrective actions; safety issues and requirements; review specifications against customer requirements

Standard conventions: eg layout, symbols used, line types and line work

Features associated with technical information: details of the manufacturing process eg sequence, storage and dispatch; product details eg size, material requirements, number of components; quality control systems and requirements; use of eg graphs, tables and charts

4 Demonstrate an awareness of working in engineering

Expected approach: following organisational policies and procedures eg health and safety; complying with appropriate legislation; working in a way that keeps self and others safe; maintaining effective relationships in the workplace eg colleagues, managers; professional conduct and behaviour eg timekeeping, when dealing with customers, visitors or other external people

Requesting advice: appropriate people eg supervisor, health and safety officer; outline the problem/issue clearly and concisely; listen to the response; clarify any points that are not understood fully

Conflict situations: identification of potential for conflict eg seeking advice from the appropriate people; skills to avoid conflict situations eg active listening, asking questions politely and calmly; effective communication, knowing when to remove yourself from the situation

Workplace teams: roles and responsibilities of all team members; importance of effective team leadership; deal with problems or issues quickly and effectively eg disagreements within the team, disagreements with the team leader, unpopular decisions; training and development eg skill levels, development needs, aspirations; team working eg within deadlines, team discussions and meetings, giving and receiving constructive feedback

Essential guidance for tutors

Delivery

This unit should be delivered in a way that develops knowledge and understanding of working in the rail engineering sector. Learners need to know and understand:

- health and safety requirements and regulations
- how to communicate effectively
- appropriate drawings and specifications
- what it means to work within the rail engineering sector.

A useful opening would be through small-group discussions, during which learners can exchange their experiences of rail engineering. Tutors can take feedback on a flipchart or board to share the discussions of individual groups.

Learners should be encouraged to engage with employers and, where possible, other employees to gain knowledge and understanding of the sector.

Knowledge of issues relating to working in the rail engineering sector gained through engaging with employers and employees, rather than through a purely theoretical context, is key. This should be made possible by learners working with current industry employees, for example a maintenance depot technician, where possible, and through the use of guest speakers and video/DVD training programmes.

For example, a presentation by a workshop manager will support delivery, as well as adding vocational relevance and currency. The visiting speaker could deliver a summary of what is involved in working in rail engineering, including the importance of effective communication and complying with health and safety regulations and policies. This should be supported by examples drawn from industry or through developed case studies that highlight the importance of complying with the associated regulations, the implications of non-compliance and the use and purpose of engineering drawings and specifications. Learners could then work in groups to interpret technical drawings and specifications.

This unit could be delivered through distance learning. However, this will involve additional, and different, considerations, such as planning, and other measures to ensure learners can gain the required knowledge and understanding.

Assessment

A variety of assessment methods can be used. Learners could produce written reports or give verbal presentations, supported by witness testimony. An alternative could be logbooks or workbooks completed in the workplace or during visits.

Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the assessment criteria. Centres are encouraged to emphasise the practical application of the assessment criteria.

Essential resources

Indicative resource materials

Textbooks

Barnett C F – *Practical Railway Engineering* (Imperial College Press, 2nd revised edition, 2005) ISBN 978860945151

Chandra S – *Railway Engineering* (OUP Oxford, 2007) ISBN 9780195687798

Health and Safety Executive – *Essentials of Health and Safety at Work* (HSE Books, 2006) ISBN 9780717661794

Health and Safety Executive – *Health and Safety in Engineering Workshops* (HSE Books, 2004)ISBN 9780717617173

Simmons D, Maguire D and Phelps N – *Manual of Engineering Drawing* (Butterworth-Heinemann, 2009) ISBN 9780750689854

Magazine

The Rail Engineer

Website

www.hse.gov.uk/	Health and Safety Executive

Unit 2: Engineering Technology

Unit code: K/602/5875

QCF level 2: BTEC Specialist

Credit value: 7

Guided learning hours: 70

Unit aim

The aim of this unit is to enable learners to develop a knowledge and understanding of engineering materials and their properties so that they can select appropriate materials for different engineering applications. Learners will also develop their skills in applying analytical methods to mathematical and science applications.

Unit introduction

Engineering technicians need to be able to identify the materials specified on engineering drawings, production plans and servicing schedules. It is essential to select the correct material if a product or a replaced component is to be fit for its intended purpose.

This unit will give learners an understanding of a range of common materials encountered in engineering, the properties that make individual materials suitable for particular tasks and their sources of supply.

One of the main functions of an engineer is to solve problems, many of which require the use of mathematical formulae and equations. In this unit learners will have the opportunity to carry out a range of calculations and work with and manipulate equations. Mensuration is another important tool, with engineers often required to determine areas of regular and compound shapes together with volumes of regular and compound solid bodies, for instance when evaluating costs and quantities of material needed for particular projects.

Learners will explore scientific concepts and principles associated with engineering applications, such as power, force and density, and carry out a range of scientific calculations.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes		Assessment criteria	
1	Know requirements for materials in engineering	1.1	Select materials for common engineering applications
		1.2	Select forms of supply of materials
		1.3	Differentiate between materials by their physical properties
2	Know the properties of engineering materials	2.1	Compare the physical properties of materials
		2.2	Define what is meant by mechanical properties of materials
		2.3	Compare the mechanical properties of materials
		2.4	Describe methods of modifying properties of materials
3	Apply analytical methods to engineering mathematical applications	3.1	Apply appropriate degree of accuracy to express numbers
		3.2	Describe tolerance in terms of limits of size
		3.3	Perform calculations to determine the areas of basic shapes
		3.4	Perform calculations to determine the areas of compound shapes
		3.5	Perform calculations to determine the surface areas of regular-shaped solids
		3.6	Perform calculations to determine the volumes of regular-shaped solids
		3.7	Perform calculations to determine the value of angles in a triangle
		3.8	Apply Pythagoras' Theorem to right-angled triangle problems
		3.9	Interpret straight line graphs using given data
		3.10	Apply multiple prefix symbols appropriately

Learning outcomes		Assessment criteria	
4	Apply analytical methods to engineering science applications	4.1	Perform calculations to determine the value of a force
		4.2	Perform calculations to determine work done by a simple machine
		4.3	Perform calculations to determine power used
		4.4	Perform calculations to determine energy used
		4.5	Perform calculations to determine the efficiency of a machine
		4.6	Perform calculations to determine the turning moment of a force
		4.7	Perform calculations to determine the relative density of engineering materials
		4.8	Apply principles to determine simple electrical circuit problems
		4.9	Perform calculations to determine the strength of engineering materials
		4.10	Perform calculations to determine pressure
		4.11	Perform calculations to determine apply multiple prefix symbols appropriately

Unit content

1 Know requirements for materials in engineering

Selecting materials: ferrous material eg cast iron, low and high carbon steel, stainless steel; non-ferrous material eg aluminium, brass, bronze, copper, lead; organic materials eg hard and soft woods, wood composites; thermoplastics eg PVC, nylon, PTFE, polythene, Perspex; thermosetting polymer eg Bakelite, Formica, melamine, Kevlar epoxy resin, polyester resin, reinforcing material (glass fibres, carbon fibres, wood flour); smart materials eg piezoelectric materials, shape memory alloys, magneto-rheostatic fluids, electro-rheostatic fluids

Forms of supply: form eg bar stock, sheet materials, pipe/tube, wire, rolled steel sections, castings, forgings, mouldings, extrusions, powders and fluids; surface finish eg bright drawn, cold drawn, plated, painted, plastic coated; size eg diameter(s), thickness, gauge

Differentiate between materials: in terms of eg properties, features, functions, appearance

2 Know the properties of engineering materials

Physical properties: resistance to corrosion, solvents, environmental degradation, wear, density, melting point

Mechanical properties: tensile strength, hardness, toughness/brittleness, malleability/ductility

Modifying properties: effects of processing materials eg hot working, cold working, mould pressure and temperature, processing parameters; preservation of materials; extending material lifespan

3 Apply analytical methods to engineering mathematical applications

Degree of accuracy: approximations eg rounding up/down; significant figures, decimal places

Tolerance: angles eg within +/- 0.5 degrees; dimensional tolerance eg flatness within 0.125mm per 25mm

Area of basic shapes: regular shapes eg squares, rectangles, triangles, circles

Compound shapes: eg L-shapes, parallelograms, squares, rectangles, triangles, circles

Surface area and volumes: regular solid bodies eg right rectangular prisms, cylinders, cones, spheres

Angles in a triangle: equilateral, right angles, isosceles

Phythagoras' Theorem: definition; application and use in solving problems

Interpret straight line graphs: determining gradient, intercept eg for V=IR plot V against I for constant value of R, for V = U+ AT, plot V against T for constant value of A

Apply multiple prefix symbols: eg 10^{-3} (multiple) has the prefix milli and uses the symbol m, 10^{3} (multiple) has the prefix kilo and used the symbol k; use examples such as mm, kg, ns (nanoseconds)

4 **Apply analytical methods to engineering science applications**

Force: types; using formulae to establish value; moment of a force

Work done: use of formulae to establish work done; definition

Power usage: electrical, mechanical

Energy usage: electrical, mechanical

Machine efficiency: electrical and mechanical power and energy

Moment of a force: torque, levers

Relative density: definition, difference between density and RD, units eg RD of Aluminium is 2.7 so it is 2.7 times as dense as water

Strength of engineering materials: graphs eg force/extension, stress/strain; stress – tensile, yield

Simple electrical circuit problems: Ohm's law V = IR; formulae for resistors in series and parallel

Pressure: definition eg P = F/A

Multiple prefix symbols: calculations eg convert 750 millilitres to litres, convert 8000 kilobits/second to gigabits/second, convert 3000 nanoseconds to seconds

Essential guidance for tutors

Delivery

This unit should be delivered in a way that develops knowledge and understanding of the basic principles of mathematics and science, and of the materials that support engineering activities. Learners need to know and understand:

- requirements for engineering materials and their properties
- analytical methods used in engineering mathematical and science applications.

A useful opening would be through small-group discussions, during which learners can exchange their experiences of engineering technology. Tutors can take feedback on a flipchart or board to share the discussions of individual groups.

Learners should be encouraged to engage with employers and, where possible, other employees, to gain knowledge and understanding of how this technology is applied in the workplace.

Knowledge of issues gained through engaging with employers and employees, rather than in a purely theoretical context, is key. This should be made possible by learners working with others who perform calculations and use the results, for example to determine power used and machine efficiency, where possible, and through the use of guest speakers and video/DVD training programmes.

For example, a presentation by a senior technician will support delivery, as well as adding vocational relevance and currency. The visiting speaker could deliver a summary of the different engineering materials used in their organisation and their properties, as well as the key calculations that underpin engineering mathematical and science applications. This should be supported by examples drawn from industry or through developed case studies that highlight the importance of carrying out any calculations accurately and of selecting the correct engineering materials, together with the consequences if this does not happen.

This unit could be delivered through distance learning. However, this will involve additional, and different, considerations, such as planning, and other measures to ensure learners can gain the required knowledge and understanding.

Assessment

A variety of assessment methods could be used. Learners could produce written reports or give verbal presentations, supported by witness testimony. Other alternatives could be logbooks or workbooks completed in the workplace or during visits.

Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the assessment criteria. Centres are encouraged to emphasise the practical application of the assessment criteria.

Essential resources

Indicative resource materials

Textbooks

Barnett C F – *Practical Railway Engineering* (Imperial College Press, 2nd revised edition, 2005) ISBN 978860945151

Bird J – *Basic Engineering Mathematics* (Elsevier, 2005) ISBN 9780750665759

Bird J O – *Science for Engineering* (Newnes, 2003) ISBN 0750657774

Bolton W – *Engineering Science* (Newnes, 2006) ISBN 0750680830

Chandra S – *Railway Engineering* (OUP Oxford, 2007) ISBN 9780195687798

Stroud K – *Engineering Mathematics* (Industrial Press, 2008) ISBN 0831133279

Timings R L – *Engineering Materials, Volume 1* (Longman, 1998) ISBN 0582319285

Timings R L – *Engineering Materials, Volume 2* (Longman, 2000) ISBN 0582404665

Magazine

The Rail Engineer

Website

www.hse.gov.uk/	Health and Safety Executive

Unit 3: Maintenance Technology

Unit code: T/602/5877

QCF level 2: BTEC Specialist

Credit value: 7

Guided learning hours: 70

Unit aim

The aim of this unit is to enable learners to gain a knowledge and understanding of the principles and processes related to a range of routine maintenance activities. Learners will also develop the skills needed to carry out this maintenance using safe and effective working practices.

Unit introduction

Engineering maintenance involves the service, repair and adjustment of engineering equipment and machinery in order to ensure that it continues to perform its intended function. It is vital that organisations have effective maintenance planning and procedures in place to guarantee the reliable and safe operation of machinery and equipment. The correct maintenance of engineering systems results in improved efficiency and can save organisations time and money.

In this unit learners will explore engineering maintenance methods and procedures, and plan and carry out maintenance activities on engineering systems.

Learners will also complete the necessary documentation.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes		Assessment criteria	
1	Use safe and effective working practices	1.1	Describe safe working practices and health and safety requirements
		1.2	Describe the hazards associated with maintenance activities
		1.3	Describe information from sources
		1.4	Describe types of maintenance activities
		1.5	Describe the factors to be considered when planning a maintenance activity
		1.6	Describe the procedures for cleaning work areas following a spillage or leakage
		1.7	Describe maintenance, diagnostic and fault location techniques and aids used
		1.8	Describe methods and techniques used to dismantle/re-assemble equipment
		1.9	Describe the information required when completing a maintenance report
2	Select working methods, tools and equipment	2.1	Set up access equipment for safe working
		2.2	Demonstrate safe lifting techniques
		2.3	Move heavy equipment across a flat surface
		2.4	Describe types and methods for using tools and equipment
		2.5	Perform measurement and alignment using equipment
		2.6	Replace life-determined items
		2.7	Describe the application of lubricants

Learning outcomes		Assessment criteria	
3	Use dismantling/assembly techniques for components/systems	3.1	Dismantle an engineering device or system
		3.2	Re-assemble an engineering device or system
		3.3	Restore the work area
		3.4	Prepare a report following maintenance activities

Unit content

1 **Use safe and effective working practices**

Safe working practices: fire prevention; accident prevention and reporting; risk assessment; use of equipment; manual handling eg materials; personal protective equipment (PPE); closing down equipment safely; storing equipment correctly; safe disposal of waste materials; emergency procedures eg within the learning environment, workplace; common hazards; work area eg preparation, restoring the work area after maintenance; ensuring appropriate staff are aware of activities, use of warning signs, taping off areas

Hazards: eg flammable substances, pressurised systems, hot surfaces, electronic equipment, unfenced machinery, toxic substances and fumes, falling objects, liquid spillage, untidy work areas, badly maintained tools and equipment

Sources of information: human eg managers, maintenance personnel, operators; documentation eg production schedules, machine/process records, equipment manuals, manufacturer's instructions, technical specifications/drawings

Maintenance activities: maintenance undertaken for specific parts of an engineering system eg pump, valve, manufacturing or test equipment; planned maintenance eg routine maintenance, preventative maintenance, condition monitoring, front-line maintenance and when/where they are used, servicing; unplanned maintenance eg breakdown, front-line maintenance and when/where they are used, repair, equipment failure, run to failure

Planning maintenance activities: human (roles and responsibilities) eg managers, maintenance personnel, operators; tools, materials and equipment requirements eg basic test instruments, hand tools, replacement parts, cleaning and lubricating materials; appropriate documentation eg permit-to-work, maintenance checklists, production schedules, machine/process records; appropriate spares/materials/ consumables; appropriate test equipment and tools; site conditions eg provision of water, electricity, drainage facilities

Cleaning work areas: appropriate detergents and solvents; organisational procedures for waste disposal; environmental issues

Diagnostic and fault-finding techniques: aids eg functional charts, wiring diagrams, schematic diagrams, trouble-shooting charts, instruments (such as multimeter, signal generator, oscilloscope, logic probe, signal tracer, light meter, continuity tester), component data sheets, software-based records and data; techniques eg six point (collect the evidence, analyse evidence, locate fault, determine and remove cause, rectify fault, check system), half split, input/output, emergent sequence, visual examination, unit substitution; documentation eg operation and maintenance manuals, fault/repair reports, final test handover procedures

Dismantling/re-assembly methods and techniques: aids eg use of manufacturers' service manuals, parts lists and drawings, approved working procedures, spare parts catalogues, maintenance manuals; systems/equipment; pressure/force release, alignment, extraction

Maintenance reports: test information eg wear, missing or loose fittings, adjustments, performance; reports eg scheduled maintenance report, corrective maintenance report, maintenance log, recording of condition, description of maintenance activities carried out, hand over

2 **Select working methods, tools and equipment**

Access equipment: lifting and moving equipment eg cranes, hoists, jacks, roller and belt conveyers, robot arms, mechanical weighing equipment, ladders, scaffolding

Lifting techniques: equipment and tools eg cranes, hoists, jacks, roller and belt conveyers, robot arms, mechanical weighing equipment, levers, pulleys, chains, and ropes, fork-lift trucks; preventing damage eg sling attachment method, protective padding, approximate weights, centre of gravity; documentation eg manufacturers' data and instructions, inspection and maintenance records for the equipment; health and safety eg not exceeding the safe working load

Heavy equipment: rollers, wedges; skates, crowbars, lubricated plates

Using tools and equipment: taps, dies, easy-outs, drills, torque wrenches, pliers, jointing compounds, spanners, wire cutters, screw drivers, extractors, pipes (wrenches, cutting and threading replacement parts; approved working procedures and spare parts catalogues

Measurement and alignment: equipment eg rulers, callipers, micrometers, slip gauges, vernier protractor, vernier height gauge, dial test indicators, plumbline, spirit level, optical instruments, micrometers, voltmeters and mulit-meters; quality eg alignment balancing

Life determined items: seals and gaskets, locking devices, nuts and bolts, washers, split ins

Lubricants: lubricating devices eg grease nipples and cups, capillary action lubricators, gravity feed and forced feed lubricators; friction eg between moving parts, heat generation, methods of reducing friction, oil deterioration eg oxidation, excessive heat, ineffective storage

3 **Use dismantling/assembly techniques for components/systems**

Dismantling: aids eg use of manufacturers' service manuals, parts lists and drawings, approved working procedures, spare parts catalogues, maintenance manuals; systems eg power transmission, rotary equipment, lifting and handling; sequence of operations eg isolating a system, release of pressure and/or force, proof marking, correct storage of dismantled parts, removal and refitting eg seals, gaskets, alignment; equipment eg fused, circuit boards, presses, seals, gaskets, bearings and shafts, gears; extraction

Re-assembly: sequence of operations eg setting out components correctly, accuracy of dimensions eg dial test indication, vernier instruments, feeler gauges, protractor; parts to be replaced eg bolts and washers, nuts, seals, locking devices, gaskets; fitting parts eg mechanical or electrical locking devices, use of correct torque, correct sequence

Work area: clean the work area eg correct procedures, use of detergents; leave the work area tidy and uncluttered eg remove all used and unused items, record work carried out; store all tools and equipment safely and correctly

Report: appropriate documentation eg details of work undertaken, outcomes, any problems encountered, recommendations for further maintenance work; to the appropriate people

Essential guidance for tutors

Delivery

This unit should be delivered in a way that develops knowledge and understanding of the principles of maintenance technology within rail engineering. Learners need to know and understand:

- safe and effective working practices relating to maintenance activities
- how to select appropriate working methods, tools and equipment
- dismantling/assembly techniques for component/systems.

A useful opening would be through small-group discussions, during which learners can exchange their experiences of maintenance technology. Tutors can take feedback on a flipchart or board to share the discussions of individual groups.

Learners should be encouraged to engage with employers and, where possible, other employees, to gain knowledge and understanding of the key process involved in maintenance activities.

Knowledge of issues gained through engaging with employers and employees, rather than in a purely theoretical context, is key. This should be made possible by learners working with others who carry out maintenance activities within the rail engineering sector, where possible, and through the use of guest speakers and video/DVD training programmes.

For example, a presentation by a maintenance engineer will support delivery, as well as adding vocational relevance and currency. The visiting speaker could deliver a summary of how maintenance activities are handled in their organisation and how all staff work to ensure that safe working practices are adhered to and the correct equipment, tools and techniques are used. This should be supported by examples drawn from industry or through developed case studies that highlight the importance of working safely, of planning maintenance activities properly, replacing items as necessary, and of restoring the work area after the maintenance has been completed.

This unit could be delivered through distance learning. However, this will involve additional, and different, considerations, such as planning, and other measures to ensure learners can gain the required knowledge and understanding.

Assessment

A variety of assessment methods could be used. Learners could produce written reports or give verbal presentations, supported by witness testimony. An alternative could be logbooks or workbooks completed in the workplace or during visits.

Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the assessment criteria. Centres are encouraged to emphasise the practical application of the assessment criteria.

Essential resources

Indicative resource materials

Textbooks

Barnett C F – *Practical Railway Engineering* (Imperial College Press, 2nd revised edition, 2005) ISBN 978860945151

Chandra S – *Railway Engineering* (OUP Oxford, 2007) ISBN 9780195687798

Health and Safety Executive – *Essentials of Health and Safety at Work* (HSE Books, 2006) ISBN 9780717661794

Health and Safety Executive – *Health and Safety in Engineering Workshops* (HSE Books, 2004) ISBN 9780717617173

Mobley R K – *Maintenance Fundamentals* (Butterworth-Heinemann, 2004) ISBN 0750677988

Magazine

The Rail Engineer

Website

www.hse.gov.uk/	Health and Safety Executive

Unit 4: Maintaining Mechanical Devices and Equipment

Unit code: A/602/5878

QCF level 2: BTEC Specialist

Credit value: 7

Guided learning hours: 70

Unit aim

The aim of this unit is to enable learners to gain a knowledge and understanding of the principles and processes related to the maintenance of mechanical devices and equipment. Learners will also develop the skills needed to carry out this maintenance.

Unit introduction

Mechanical engineering equipment and devices need to be maintained to ensure continued serviceability and fitness for purpose. In this unit learners will develop the knowledge and skills necessary to undertake such maintenance in a safe and efficient manner.

Learners will gain knowledge of the safety precautions required for personal protection, the protection of others and the safe handling of the equipment and systems they will find in a mechanical engineering environment.

In particular, learners will carry out activities that develop their skills in and knowledge of fault-finding, routine maintenance, dismantling and the reassembly of mechanical systems devices and equipment.

Learners will also need to obtain all necessary information, documentation, tools and equipment, prior to carrying out any given maintenance activity.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes		Assessment criteria	
1	Prepare for routine maintenance activities and dismantle devices and equipment	1.1	Demonstrate safe working practices and procedures for maintenance activities
		1.2	Describe the hazards associated with maintenance activities
		1.3	Produce a plan for a maintenance activity for a mechanical device
		1.4	Extract information from sources
		1.5	Select tools and equipment to undertake a maintenance operation
		1.6	Select appropriate cleaning technique(s)
		1.7	Dissemble mechanical devices and equipment
2	Apply fault-finding techniques	2.1	Assess devices and equipment for common faults
		2.2	Recognise wear/damage to component parts
		2.3	Deal with problems encountered during maintaining mechanical devices/equipment
3	Re-assemble mechanical devices and equipment	3.1	Reassemble mechanical devices and equipment
		3.2	Restore the work area

Unit content

1 **Prepare for routine maintenance activities and dismantle devices and equipment**

Safe working practices: fire prevention; accident prevention and reporting; risk assessment; use of equipment; manual handling eg materials; personal protective equipment (PPE); closing down equipment safely; storing equipment correctly; safe disposal of waste materials; emergency procedures eg within the learning environment, workplace; common hazards; work area eg preparation, restoring the work area after maintenance; ensuring appropriate staff are aware of the activities, use of warning signs, taping off areas

Hazards: eg flammable substances, pressurised systems, hot surfaces, electronic equipment, unfenced machinery, toxic substances and fumes, falling objects, liquid spillage, untidy work area, badly maintained tools and equipment

Plan: roles and responsibilities eg managers, maintenance personnel, operators; tools, materials and equipment requirements eg basic test instruments, hand tools, replacement parts, cleaning and lubricating materials; appropriate documentation eg permit to work, maintenance checklists, production schedules, machine/process records; appropriate spares/materials/consumables; appropriate test equipment and tools; activity eg sequence of operations, location, timescales

Sources of information: human eg managers, maintenance personnel, operators; documentation eg production schedules, machine/process records, equipment manuals, manufacturers' instructions, technical specifications/drawings

Tools and equipment: lifting equipment eg cranes, hoists, jacks, roller and belt conveyers, robot arms, mechanical weighing equipment, levers, pulleys, chains, and ropes, fork lift trucks; heavy equipment eg rollers, wedges; skates, crowbars, lubricated plates; maintenance tools and equipment eg taps, dies, easy-outs, drills, torque wrenches, pliers, jointing compounds, spanners, wire cutters, screw drivers, extractors, (wrenches, cutting and threading) replacement parts; documentation eg approved working procedures and spare parts catalogues; manufacturers' data and instructions, inspection and maintenance records for the equipment; preventing damage eg sling attachment method, protective padding, approximate weights, centre of gravity; health and safety eg not exceeding the safe working load, equipment checks (safe and usable condition, damage-free, configured correctly)

Cleaning techniques: techniques eg solvents, steam, degreasing agents, vacuuming, brushing; use of appropriate detergents and solvents; organisational procedures for waste disposal; environmental and health and safety issues

Disassembling devices and equipment: aids eg use of manufacturers' service manuals, parts lists and drawings, approved working procedures, spare parts catalogues, maintenance manuals; systems eg power transmission, rotary equipment, lifting and handling; sequence of operations eg isolating a system, release of pressure and/or force, proof marking, correct storage of dismantled parts, removal and refitting eg seals, gaskets, alignment; equipment eg fused, circuit boards, presses, seals, gaskets, bearings and shafts, gears; extraction

2 **Apply fault-finding techniques**

Common faults: aids eg functional charts, diagrams, trouble shooting charts, dial test indicators, torque measuring devices, flow meters, alignment devices, self-diagnostic equipment, pressure/force indicators, component data sheets, software-based records and data; techniques eg

Six point (collect the evidence, analyse evidence, locate fault, determine and remove cause, rectify fault, check system); half split, input/output, unit substitution, emergent sequence, visual examination; documentation eg operation and maintenance manuals, fault/repair reports, final test handover procedures

Wear/damage: tools, equipment and components eg clutches, brakes, drive belts, gearboxes, bearings and shafts, seals and gaskets; types eg corrosion, leaking seals and gaskets, excessive movement, fractures, missing or incorrect parts

Problems: eg parts tools and equipment unavailable or damaged, damage during dismantling or reassembly

3 **Reassemble mechanical devices and equipment**

Reassembling devices and equipment: sequence of operations eg setting out components correctly; accuracy of dimensions eg dial test indication, vernier instruments, feeler gauges, protractor; parts to be replaced eg bolts and washers, nuts, seals, locking devices, gaskets; fitting parts eg mechanical or electrical locking devices, use of correct torque, correct sequence; identification of component/parts to be disposed of eg bolts and washer, seals and gaskets; apply correct tightening eg tightening sequence, torque; correct lubrication eg application methods, types of lubricants

Work area: clean the work area eg correct procedures, use of detergents; leave the work area tidy and uncluttered eg remove all used and unused items, record work carried out; store all tools and equipment safely and correctly

Report: appropriate documentation eg detail work undertaken, outcomes, any problems encountered, recommendation for further maintenance work; to the appropriate people

Essential guidance for tutors

Delivery

This unit should be delivered in a way that develops knowledge and understanding of the principles of maintaining mechanical devices and equipment within the rail engineering sector. Learners need to know and understand:

- how to prepare for routine maintenance
- how to dismantle devices and equipment
- fault-finding techniques
- reassembling mechanical devices and equipment.

A useful opening would be through small group discussions, during which learners can exchange their experiences of maintaining mechanical devices and equipment. Tutors can take feedback on a flipchart or board to share the discussions of individual groups.

Learners should be encouraged to engage with employers and, where possible, other employees to gain knowledge and understanding of the key process involved in maintenance activities.

Knowledge of issues gained through engaging with employers and employees, rather than in a purely theoretical context, is key. This should be made possible by learners working with others who carry out maintenance of mechanical devices and equipment within rail engineering, through eg guest speakers and video/DVD training programmes.

For example, a presentation by a maintenance engineer will support delivery, as well as adding vocational relevance and currency. The visiting speaker could deliver a summary of how mechanical devices and equipment are maintained in their organisation and how all staff work to ensure that safe working practices are adhered to and the correct equipment, tools and techniques are used. This should be supported by examples drawn from industry or through developed case studies that highlight the importance of working safely, of planning maintenance activities properly, of dealing with any problems items as necessary, and of restoring the work area after the maintenance has been performed.

This unit could be delivered through distance learning. However, this will involve additional, and different, considerations, such as planning, and other measures to ensure learners can gain the required knowledge and understanding.

Assessment

A variety of assessment methods can be used. Learners could produce written reports or give verbal presentations, supported by witness testimony. An alternative could be logbooks or workbooks completed in the workplace or during visits.

Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the assessment criteria. Centres are encouraged to emphasise the practical application of the assessment criteria.

Essential resources

Indicative resource materials

Textbooks

Barnett C F – *Practical Railway Engineering* (Imperial College Press; 2nd revised edition, 2005) ISBN 978860945151

Chandra S – *Railway Engineering* (OUP Oxford, 2007) ISBN 9780195687798

Health and Safety Executive – *Essentials of Health and Safety at Work* (HSE Books, 2006) ISBN 9780717661794

Health and Safety Executive – *Health and Safety in Engineering Workshops* (HSE Books, 2004) ISBN 9780717617173

Mobley R K – *Maintenance Fundamentals* (Butterworth-Heinemann, 2004) ISBN 0750677988

Magazine

The Rail Engineer

Website

www.hse.gov.uk/	Health and Safety Executive

Unit ERR1: Employment Rights and Responsibilities in the Passenger Transport Sector

Unit code: L/602/5934

QCF level 2: BTEC Specialist

Credit value: 3

Guided learning hours: 18

Unit aim

The aim of this unit is for learners to demonstrate understanding of employer and employee statutory rights and responsibilities within their own organisations and industry under employment law.

Unit introduction

This is an additional unit which can be taken in addition to the mandatory rail engineering units.

Learners should be aware of, and conversant with, the rules, principles and regulations governing employment rights and responsibilities to ensure they understand the conditions under which they work. This understanding protects both the employee and the employer, ensuring that work practice is undertaken in a mutually respectful and safe environment.

This unit is for learners who are taking this qualification as part of the Rail Services Apprenticeship framework. The unit has been developed by GoSkills to cover the requirements of Employment Rights and Responsibilities within the Specification of Apprenticeship Standards for qualifications within the passenger transport sector. It has been designed to be applied to a work context. It should be contextualised to be relevant to learners' places of work in the passenger transport sector, in this case employment in the rail engineering sector.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes		Assessment criteria	
1	Know employment rights and responsibilities of the employee and employer	1.1	Identify the main points of legislation affecting employers and employees and their purpose relevant to own role, organisation and within own industry
		1.2	Identify where to find information and advice on employment rights and responsibilities both internally in own organisation and externally
		1.3	Identify sources of information and advice on own industry, occupation, training and own career pathway
		1.4	Identify sources of information on the different types of representative bodies related to own industry and their main roles and responsibilities
		1.5	Identify any issues of public concern that may affect own organisation and own industry
2	Understand employment rights and responsibilities and how these affect organisations	2.1	Describe organisational procedures, policies and codes of practice used by own organisation on employment rights and responsibilities
		2.2	Explain the purpose of following health, safety and other procedures and the effect on own organisation if they are not followed
		2.3	Describe employer and employee responsibilities for equality and diversity within own organisation

Learning outcomes		Assessment criteria	
		2.4	Explain the benefits of making sure equality and diversity procedures are followed
		2.5	Describe the career pathways available within own organisation and own industry

Unit content

1 **Know employment rights and responsibilities of the employee and employer**

Employee rights and responsibilities: difference between rights and responsibilities; current employment legislation; current anti-discrimination legislation eg gender, race, religion, disability, age; working hours and holiday entitlement; data protection; other relevant examples

Employer rights and responsibilities: duty of care to employees eg safe and healthy workplace, public liability insurance; appropriate training and development; adhere to terms of contract

Sources and types of information on employment issues: HR department; line manager; trade union representative; professional body; Citizens Advice Bureau; community legal advice; internet; trade magazines and journals

Sources of information: line manager, Sector Skills Councils, Jobcentre, relevant websites

Main roles and responsibilities of representative bodies: trade unions, professional bodies, Health and Safety Executive

Issue of public concern: the effect of recent high-profile events on the industry eg Hatfield rail disaster, King's Cross Underground fire

Effects of public concern: legislation and good practice eg Criminal Record Bureau checks, risk assessment; health and safety legislation, disabilities and effects on access to transport

2 **Understand employment rights and responsibilities and how these affect organisations**

Contract of employment: terms and conditions; hours; pay rate; holiday entitlement; format of contract

Interpret information on payslip: gross wages; deductions; net pay; personal information eg national insurance number, employee number

Grievance procedure: grounds for grievance; informal approach; formal procedure within own workplace

Types of information held on personnel records: personal data eg name, address, telephone number(s), qualifications, national insurance number, tax code, bank details, disabilities, employment history, absence details, training

Updating information held on personnel records: personal responsibility; data protection considerations

Ways of working with employer: workplace procedures for leave entitlement eg holiday, maternity, paternity, compassionate; procedures to deal with bullying or discrimination; procedures for self-certification

Own role in the workplace: own job description, organisation's aim

Role of the sector: aims and objectives of the employment sector

Career pathways: progression routes within own sector; progression routes within related sectors; importance of continuing professional development

Developing own career path: create a development plan; consult related websites

Essential guidance for tutors

Delivery

This unit includes topics that apply generally and others that apply specifically to the learner's workplace. Input should be as varied as possible, making good use of internet resources and websites, together with group work, individual study and team activities as well as more traditional written tasks. Learners should be encouraged to read around the subject to gain more understanding of the content of the relevant legislation.

Visiting speakers, who work in various parts of the organisation or for associated organisations, would enliven the programme.

All study should be related to the workplace.

Assessment

This unit should be assessed as part of the learner's work towards this qualification.

It should be assessed predominantly in the workplace. Observation, witness testimony, questioning, professional discussion and written and product evidence are all sources of evidence which can be used.

Naturally occurring evidence should be used where possible. It is likely that learners will undertake an induction process for any work role or work placement. Learners could build a portfolio of evidence or workbook that, as well as showing evidence of achievement, could be used as a point of reference for future work.

Indicative resource materials

Handbooks

Mitchell Sack S – *The Employee Rights Handbook* (Warner Books, 2000)
ISBN 9780446673266

Mitchell Sack S – *The Employee Rights Handbook: Effective Legal Strategies to Protect Your Job from Interview to Pink Slip* (Legal Strategies Inc, 2010)
ISBN 9780963630674

Further information

For further information please call Customer Services on 0844 576 0026 (calls may be recorded for training purposes) or visit our website (www.edexcel.com).

Useful publications

Related information and publications include:

- Guidance for Centres Offering Edexcel/BTEC QCF Accredited Programmes (Edexcel, distributed to centres annually)
- Functional skills publications – specifications, tutor support materials and question papers
- Regulatory arrangements for the Qualification and Credit Framework (published by Ofqual) August 2008
- the current Edexcel publications catalogue and update catalogue.

Edexcel publications concerning the Quality Assurance System and the internal and external verification of vocationally related programmes can be found on the Edexcel website and in the Edexcel publications catalogue.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

Please contact:

GoSkills

Concorde House, Trinity Park
Solihull
West Midlands
B37 7UQ

Telephone: 0121 635 5520
Fax: 0121 635 5521
Email: info@goskills.org

Professional development and training

Edexcel supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building functional skills into your programme
- building in effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website (www.edexcel.com/training). You can request customised training through the website or by contacting one of our advisers in the Training from Edexcel team via Customer Services to discuss your training needs.

Our customer service numbers are:

BTEC and NVQ	0844 576 0026
GCSE	0844 576 0027
GCE	0844 576 0025
The Diploma	0844 576 0028
DiDA and other qualifications	0844 576 0031

Calls may be recorded for training purposes.

The training we provide:

- is active – ideas are developed and applied
- is designed to be supportive and thought-provoking
- builds on best practice.

Our training is underpinned by the LLUK standards for those preparing to teach and for those seeking evidence for their continuing professional development.

Annexe A

The Edexcel/BTEC qualification framework for the passenger transport sector

Progression opportunities within the framework.

Level	General qualifications	BTEC full vocationally related qualifications	BTEC specialist courses	NVQ/occupational
8				
7				
6				
5				
4				
3				Edexcel Level 3 Diploma in Rail Engineering Track Maintenance (QCF)

Level	General qualifications	BTEC full vocationally related qualifications	BTEC specialist courses	NVQ/occupational
2			Edexcel Level 2 Award in Rail Services (QCF)	Edexcel Level 2 NVQ Diploma in Rail Engineering (Track Maintenance) (QCF) Edexcel Level 2 NVQ Diploma in Rail Services (Control Room Operations) (QCF) Edexcel Level 2 NVQ Certificate/Diploma in Rail Services (Passenger Services) (QCF) Edexcel Level 2 NVQ Diploma in Rail Services (Signal Operations) (QCF) Edexcel Level 2 NVQ Diploma in Rail Services (Driving) (QCF) Edexcel Level 2 NVQ Certificate in Rail Services (Shunting) (QCF)
1				
Entry				

Annexe B

Wider curriculum mapping

Edexcel Level 2 qualifications give learners opportunities to develop an understanding of spiritual, moral, ethical, social and cultural issues as well as an awareness of citizenship, environmental issues, European developments, health and safety considerations and equal opportunities issues.

Spiritual, moral, ethical, social and cultural issues

Throughout the delivery of these qualifications learners will have the opportunity to actively participate in different kinds of decision making. They will have to consider fair and unfair situations and explore how to resolve conflict. Working in small groups they will learn how to respect and value others' beliefs, backgrounds and traditions.

Citizenship

Learners undertaking these qualifications will have the opportunity to develop their understanding of citizenship issues.

Environmental issues

Developing a responsible attitude towards the care of the environment is an integral part of these qualifications. Learners are encouraged to minimise waste and discuss controversial issues.

European developments

Much of the content of the qualifications applies throughout Europe, even though the delivery is in a UK context.

Health and safety considerations

Health and safety is embedded within many of the units in the qualifications. Learners will consider their own health and safety at work, how to identify risks and hazards and how to minimise those risks.

Equal opportunities issues

There will be opportunities throughout the qualifications to explore different kinds or rights and how these affect both individuals and communities, for example learners will consider their rights at work and the rights of employers and how these rights affect the work community.

Annexe C

National Occupational Standards

The grid below maps the knowledge covered in the Edexcel Level 2 Certificate in Rail Engineering Underpinning Knowledge (QCF) against the underpinning knowledge of the National Occupational Standards in the Public Transport Sector.

KEY

✓ indicates complete coverage of the NOS

\# indicates partial coverage of the NOS

a blank space indicates no coverage of the underpinning knowledge

Units	1	2	3	4
National Occupational Standards in Public Transport Sector	✓	✓	✓	✓

Annexe D

Mapping to Level 1 Functional Skills

Level 1	Unit number									
English – speaking, Listening and Communication	**1**	**2**	**3**	**4**						
Take full part in formal and informal discussions and exchanges that include unfamiliar subjects	✓	✓	✓	✓						
English – reading										
Read and understand a range of straightforward texts	✓	✓	✓	✓						
English – writing										
Write a range of texts to communicate information, ideas and opinions, using formats and styles suitable for their purpose and audience	✓	✓	✓	✓						

Level 1	Unit number									
Mathematics – representing	**1**	**2**	**3**	**4**						
Understand practical problems in familiar and unfamiliar contexts and situations, some of which are non-routine		✓								
Identify and obtain necessary information to tackle the problem		✓								
Select mathematics in an organised way to find solutions		✓								
Mathematics – analysing										
Apply mathematics in an organised way to find solutions to straightforward practical problems for different purposes		✓								
Use appropriate checking procedures at each stage		✓								
Mathematics – interpreting										
Interpret and communicate solutions to practical problems, drawing simple conclusions and giving explanations	✓	✓								

Annexe E

Glossary of accreditation terminology

The following information about this qualification can also be found on the Edexcel website

Accreditation start/end date	The first/last dates that Edexcel can register learners for a qualification.
Certification end date	The last date on which a certificate may be issued by Edexcel.
Credit value	All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.
Guided Learning Hours (GLH)	Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.
Learning Aims Reference Application (LARA)	Link to the Learning Aims Reference Application (LARA), which features detailed funding information by specific learning aim reference.
Learning Aim Reference	Unique reference number given to the qualification by the funding authorities on accreditation.
Level	The level at which the qualification is positioned in the Qualifications and Credit Framework (QCF).
Performance tables	This qualification is listed on the Department for Education (DfE) website School and College Achievement and Attainment Tables (SCAAT) as performance indicators for schools and colleges.
Qualifications Number (QN)	Unique reference number given to the qualification by the regulatory authorities on accreditation.
Register of Regulated Qualifications	Link to the entry on the Register of Regulated Qualifications for a particular qualification. This database features detailed accreditation information for the particular qualification.
Section 96	Section 96 is a section of the Learning and Skills Act 2000. This shows for which age ranges the qualification is publicly funded for under-19 learners.

Title	The accredited title of the qualification.
UCAS points	This qualification is listed on the Universities and Colleges Admissions Service (UCAS) tariff for those wishing to progress to higher education.

Annexe F

BTEC Specialist and Professional qualifications

BTEC qualifications on the NQF	Level	BTEC Specialist and Professional qualifications on the QCF	BTEC qualification suites on the QCF
BTEC Level 7 Advanced Professional qualifications BTEC Advanced Professional Award, Certificate and Diploma	7	**BTEC Level 7 Professional qualifications** BTEC Level 7 Award, Certificate, Extended Certificate and Diploma	
BTEC Level 6 Professional qualifications BTEC Professional Award, Certificate and Diploma	6	**BTEC Level 6 Professional qualifications** BTEC Level 6 Award, Certificate, Extended Certificate and Diploma	
BTEC Level 5 Professional qualifications BTEC Professional Award, Certificate and Diploma	5	**BTEC Level 5 Professional qualifications** BTEC Level 5 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 5 Higher Nationals qualifications** BTEC Level 5 HND Diploma
BTEC Level 4 Professional qualifications BTEC Professional Award, Certificate and Diploma	4	**BTEC Level 4 Professional qualifications** BTEC Level 4 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 4 Higher Nationals qualifications** BTEC Level 4 HNC Diploma
BTEC Level 3 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	3	**BTEC Level 3 Specialist qualifications** BTEC Level 3 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 3 Nationals qualifications** BTEC Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma

BTEC qualifications on the NQF	Level	BTEC Specialist and Professional qualifications on the QCF	BTEC qualification suites on the QCF
BTEC Level 2 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	2	**BTEC Level 2 Specialist qualifications** BTEC Level 2 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 2 Firsts qualifications** BTEC Level 2 Certificate, Extended Certificate and Diploma
BTEC Level 1 qualifications BTEC Award, Certificate, Extended Certificate and Diploma	1	**BTEC Level 1 Specialist qualifications** BTEC Level 1 Award, Certificate, Extended Certificate and Diploma	**BTEC Level 1 qualifications** BTEC Level 1 Award, Certificate and Diploma (vocational component of Foundation Learning)
	E	**BTEC Entry Level Specialist qualifications** BTEC Entry Level Award, Certificate, Extended Certificate and Diploma	**BTEC Entry-level qualifications (E3)** BTEC Entry-level 3 Award, Certificate and Diploma (vocational component of Foundation Learning)

NQF = National Qualifications Framework

QCF = Qualifications and Credit Framework

For most qualifications on the **NQF**, the accreditation end date is normally 31 August 2010 or 31 December 2010.

For qualifications on the **QCF**, the accreditation start date is usually 1 September 2010 or 1 January 2011.

QCF qualification sizes	
Award	1—12 credits
Certificate	13—36 credits
Diploma	37+ credits

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Publications Code BA029378 September 2011

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